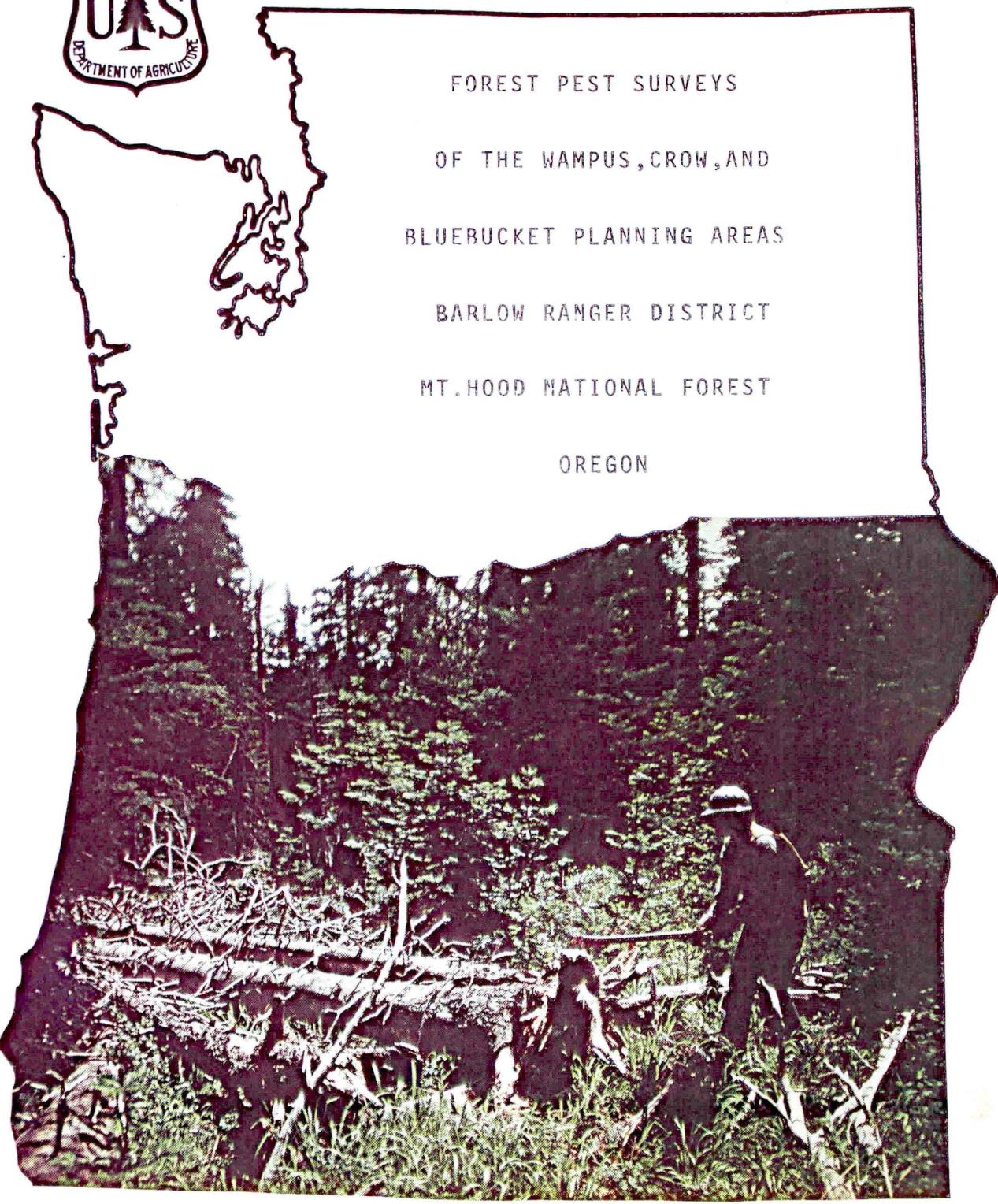


Forest Pest Management Pacific Northwest Region



Forest Pest Surveys in the Crow,
Bluebucket, and Wampus Planning Areas,
Barlow Ranger District, Mount Hood National Forest, Oregon

by

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Introduction

In East Side mixed conifer stands in Washington and Oregon, mortality, growth loss, cull, and loss of site productivity are caused by several forest pests including root pathogens, dwarf mistletoes, heartrotting fungi, and bark beetles. District silviculturalists on the Barlow Ranger District, Mount Hood National Forest, were concerned about the presence and potential damage which may be caused by these pests, and requested the aid of Forest Pest Management personnel in evaluating the Crow, Wampus, and Bluebucket Planning Units. During the summer of 1983, a FPM pathology crew surveyed these three units to determine the general location and estimate the percentage of area affected by major forest pests to provide guidelines for future management.

Methods

A line intercept survey method was used to estimate the percentage of area affected by forest pests in all planning units. Transects were established at 10-chain intervals across each unit. Transect lengths were measured and the relative position of natural openings, roads, forest type changes, and areas affected by pests were determined using a model M-25 hip chain. Size of affected areas was determined by: (1) estimating the root zone of individual trees based on tree diameter, and (2) in large diseased areas by noting the beginning and ending of an infection center along the transect based on symptomatic trees. Trees within approximately two chains of the transect were examined. From the proportion of total line length falling within affected areas, an estimate of the percentage of area affected was made.

Examinations for pests were made as follows:

The presence of root pathogens was determined by removing soil from the root collars and at least two major roots of dead, dying, or symptomatic trees. Bark surface was examined for ectotrophic mycelia of *Phellinus weiri*, the cause of laminated root rot, and the bark wood interface examined for mycelial fans of *Armillaria mellea*, the cause of Armillaria root rot. Root wood was chopped into and examined for laminated decay and setal hyphae associated with *P. weiri*; yellow, stringy decay caused by *A. mellea*; white, stringy to laminated decay caused by *Fomes annosus*; or black-stained sapwood caused by *Ceratocystis wageneri*.

Dwarf mistletoes were identified by presence of witches'-brooms and aerial plants. Infected trees were rated on a scale of 0 to 6 using Hawksworth's 6-class system (0 equals no mistletoe and 6 indicates severe infection throughout the crown). Bark beetles were identified based on gallery patterns

after a section of bark was removed from the tree. Heartrot presence, based on visible conks, was recorded by transect position; however, percentage of area affected was not estimated.

A map of each unit was constructed showing location of transects and areas affected by root disease.

Results and Recommendations

Crow Planning Unit

The Crow Planning Unit (T. 1 S., R. 10 E., secs. 13, 23, 24, 27, T. 1 S., R. 11 E., secs. 18 and 19) is composed of uneven-aged stands of mixed grand fir (*Abies grandis*), Douglas-fir (*Pseudotsuga menziesii*), western larch (*Larix occidentalis*), ponderosa pine (*Pinus ponderosa*), and lodgepole pine (*P. contorta*), with some western redcedar (*Thuja plicata*) along creek bottoms. Most of this unit is located on a fairly steep slope, and has an average elevation of 3,600 feet.

Over 20,300 yards of transects were established across the unit. A large, dry, open area on the east end of the unit, consisting of open meadows and scattered ponderosa pine was excluded from the survey.

The most abundant (54 percent) pests were dwarf mistletoes infecting Douglas-fir and western larch (Table 1). Mortality and severe infections (rating 4 to 6) in living trees were common throughout the entire area.

Table 1.--Crow Planning Unit

Forest Type	Total Yardage	Dwarf Mistletoe	Laminated Root Rot	Other ^{1/} Root Rots	Bark Beetles
Mixed Conifer Openings	17925(88) 2406(12)	9653(54) 0	5833(33) 0	335(2) 0	103(1) 0
Total	20331(100)	9653(54)	5833(33)	335(2)	103(1)

^{1/} Includes root rots caused by *Armillaria mellea* and *Fomes annosus*.

^{2/} Includes natural openings with scattered ponderosa pine

^{3/} Percentages are in parentheses

Laminated root rot of Douglas-fir and grand fir, caused by *P. weiri*, poses the most serious threat to the future productivity of this planning area. Disease centers including many windthrown and root-balled trees covered 33 percent of the planning unit with most centers in the western portion (Figure 1).

Other root diseases, caused by *A. mellea* and *F. annosus*, were found on approximately 2 percent of the planning area, primarily on weakened or injured grand fir. Fir engraver beetles (*Scolytis ventralis*) were commonly found in association with these fungi. Mountain pine beetle damage to lodgepole pine was scattered on less than 1 percent of the unit. Heartrot, caused by *E. tinctorium*, the Indian paint fungus, was common in old-growth grand fir along Crow Creek.

Recommended Stand Treatment

The percentage of area found infected with *P. weiri* in the Crow Planning Unit was relatively high, indicating that any future stand management should proceed with close attention to disease management guidelines. Laminated root rot is especially dangerous because of its ability to persist on the site. The fungus can survive for long periods of time (up to 50 years) in the roots of old stumps, infecting new hosts that become established via root contacts. New infection centers develop and increase in size due to spread from tree to tree along root systems. Douglas-fir and grand fir, major components of this unit, are highly susceptible to this disease. Planting or management of these or other susceptible species within infection centers in future rotations would prolong or intensify the problem with this disease. Cutting units should be arranged to harvest as much merchantable grand fir and Douglas-fir as possible, especially in and within 100 feet of disease centers. Within zones infected by *P. weiri*, grand fir and Douglas-fir, including advanced regeneration, should be removed.

Western larch and ponderosa pine may be retained in the overstory as seed trees or in the understory as crop trees. Special care should be taken to avoid leaving mistletoe-infected seed trees. If such trees must be left, they should be removed before regeneration reaches 3 feet in height or ten years old. Larch and pines should be favored during precommercial thinning entries.

Bluebucket Planning Unit

Bluebucket Planning Unit (T. 2 S., R. 10 E., secs. 22, 23, 26, 27) is a high elevation site (4600 to 5400 feet). Predominant tree species in these mixed conifer stands include western larch, grand fir, Pacific silver fir (*A. amabilis*), and lodgepole pine. The unit is located on moderate slopes west of the Dog River.

More than 14,500 yards of transects were established across this unit. The predominant forest pest encountered was dwarf mistletoe on western larch, accounting for 8.5 percent of the area surveyed. Mortality was most serious on large, old-growth trees. Live, infected trees with average ratings of 3 to 4 were found throughout the entire unit.

Pacific silver fir mortality, consisting of scattered, standing dead and brokentopped trees as well as small centers of dead and downed material, was found on approximately 7 percent of the area surveyed, especially near ridgelines. *A. mellea* and *F. annosus* were found in association with 30 percent of this mortality. The remaining mortality exhibited brown cubical rot of heartwood. Although no fruiting bodies were observed or isolations taken, *Laetiporus sulfureus*, the sulfur fungus, was suspected to be the causal agent.

Laminated root rot in grand fir was found on a small portion (1 percent) of the area surveyed (Figure 2). Other root diseases of grand fir caused by *F. annosus* and *A. mellea* were found on less than 1 percent of the unit, and in nearly every case, evidence of the fir engraver beetle was found in association with these fungi.

Scattered small centers of lodgepole pine (<1 percent of the area) containing standing dead and downed trees were found in the western portion of the unit. Evidence of *A. mellea* in association with bark beetles (*Dendroctonus ponderosae*) as well as mechanical damage were responsible.

Heartrot, caused by the Indian paint fungus, *E. tinctorium*, was very common in the old-growth grand fir, especially in the eastern portion of the unit near Dog River.

Recommended Stand Treatments

Many of the pest problems observed in the Bluebucket Planning Unit result from stand age structure and will most likely be alleviated when the area is managed for shorter rotations. Regeneration cuts should be placed to cover as much area as possible and affected trees removed to prevent future stand damage by dwarf mistletoes, bark beetles, Indian paint fungus, and root diseases other than laminated root rot. Care should be taken to avoid leaving mistletoe-infected western larch overstory trees. If it becomes necessary to leave these as shelterwood or seed trees, the overstory should be removed before susceptible regeneration reaches 3 feet in height or ten years old.

Where advanced grand fir regeneration will be retained, potential crop trees should be hazard rated for present rates of infection and decay caused by the Indian paint fungus. The decision to retain or destroy advanced regeneration should then be based on those ratings. Injury of residual grand fir should be avoided during harvest and intermediate cuts.

In those areas infected with *P. weiri*, merchantable grand fir should be harvested and unmerchantable trees destroyed. Western larch (preferably free of mistletoe) and lodgepole pine should be favored in the future.

Wampus Planning Unit

Wampus Planning Unit (T., 2 S., R. 10 E., secs. 24, 25, 35, 36) is a high elevation (average elevation 5200 feet) mixed conifer site composed primarily of western larch and lodgepole pine with scattered grand fir, Pacific silver fir, mountain hemlock (*Tsuga mertensiana*), Engelmann spruce (*Picea engelmannii*), Douglas-fir, and ponderosa pine. The unit is located east of Eightmile Creek on a gentle to moderate slope.

Approximately 9,000 yards of transects were established in this unit. The most frequently encountered pests were dwarf mistletoes on western larch and lodgepole pine. Mortality and live infected individuals were distributed over the entire planning unit for both species. Mortality was greatest in old-growth western larch. Infestation by mountain pine beetle in lodgepole pine, especially in size classes greater than 10 inches, was prevalent in the area. Small scattered centers of root disease caused by *F. annosus* in grand fir and Pacific silver fir, sometimes, but not always, in association with bark beetles, were also found in the unit but were not causing significant damage. Drainage problems in flat and meadow areas adjacent to Eightmile Creek were creating downfall and mortality. One small pocket of laminated root rot in grand fir was located in the northern end of the unit (Figure 3).

Recommended Stand Treatment

Effort should be made to remove mistletoe-infected western larch and lodgepole pine. If infected overstory trees must remain as seed sources, they should be removed before susceptible regeneration reaches 3 feet in height or ten years in age.

In the area affected by laminated root rot, merchantable true firs and Douglas-fir should be harvested. Unmerchantable and advanced regeneration of those species should be destroyed. Western larch, Engelmann spruce, ponderosa pine, and lodgepole pine (preferably mistletoe-free) should be favored in future management.

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Figure 1.--Map of the Crow Planning Area Showing Location of Major Areas Affected by Laminated Root Rot.

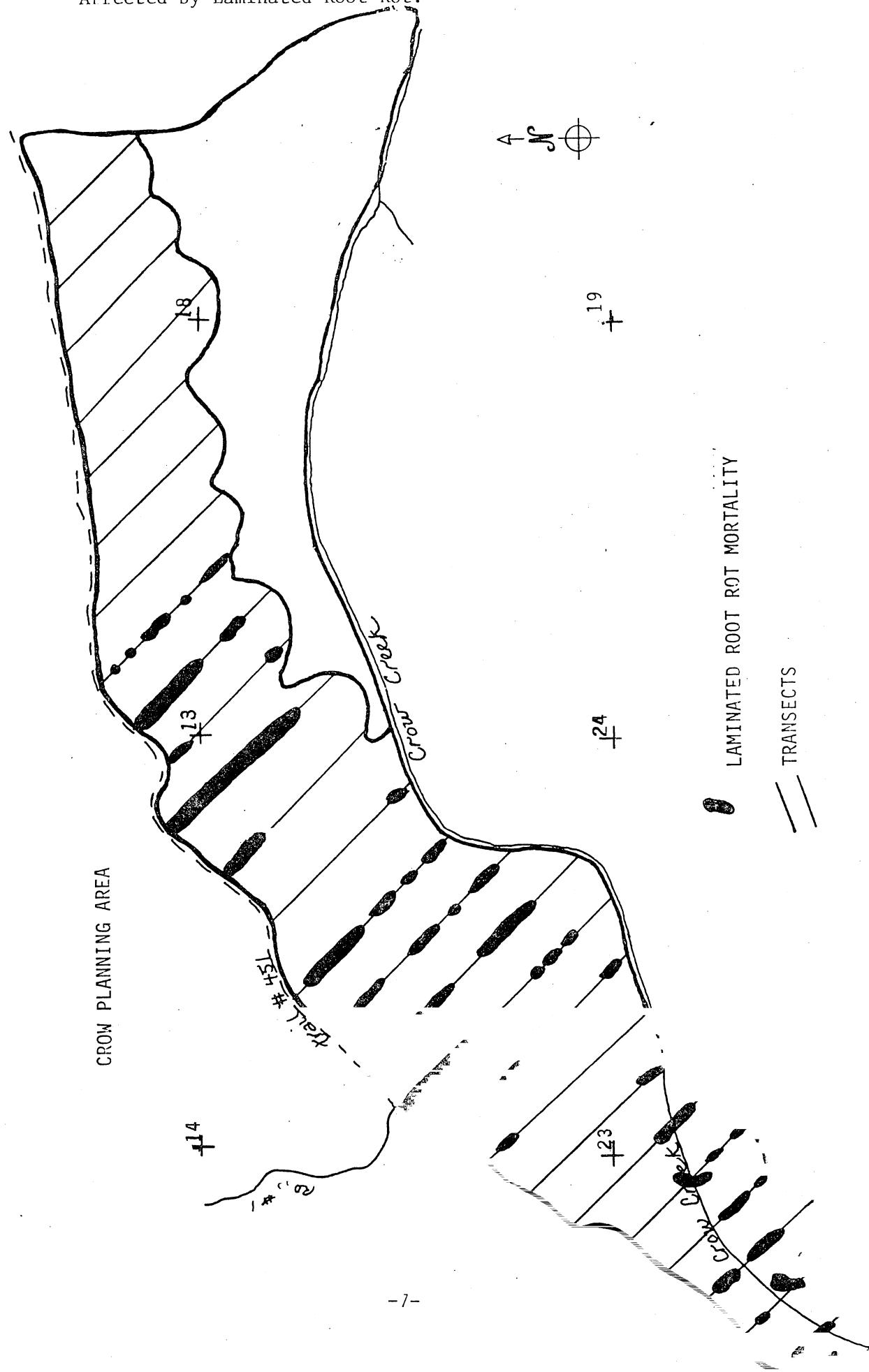


Figure 2.--Map of the Bluebucket Planning Area Showing Location of Major Areas Affected by Laminated Root Rot.

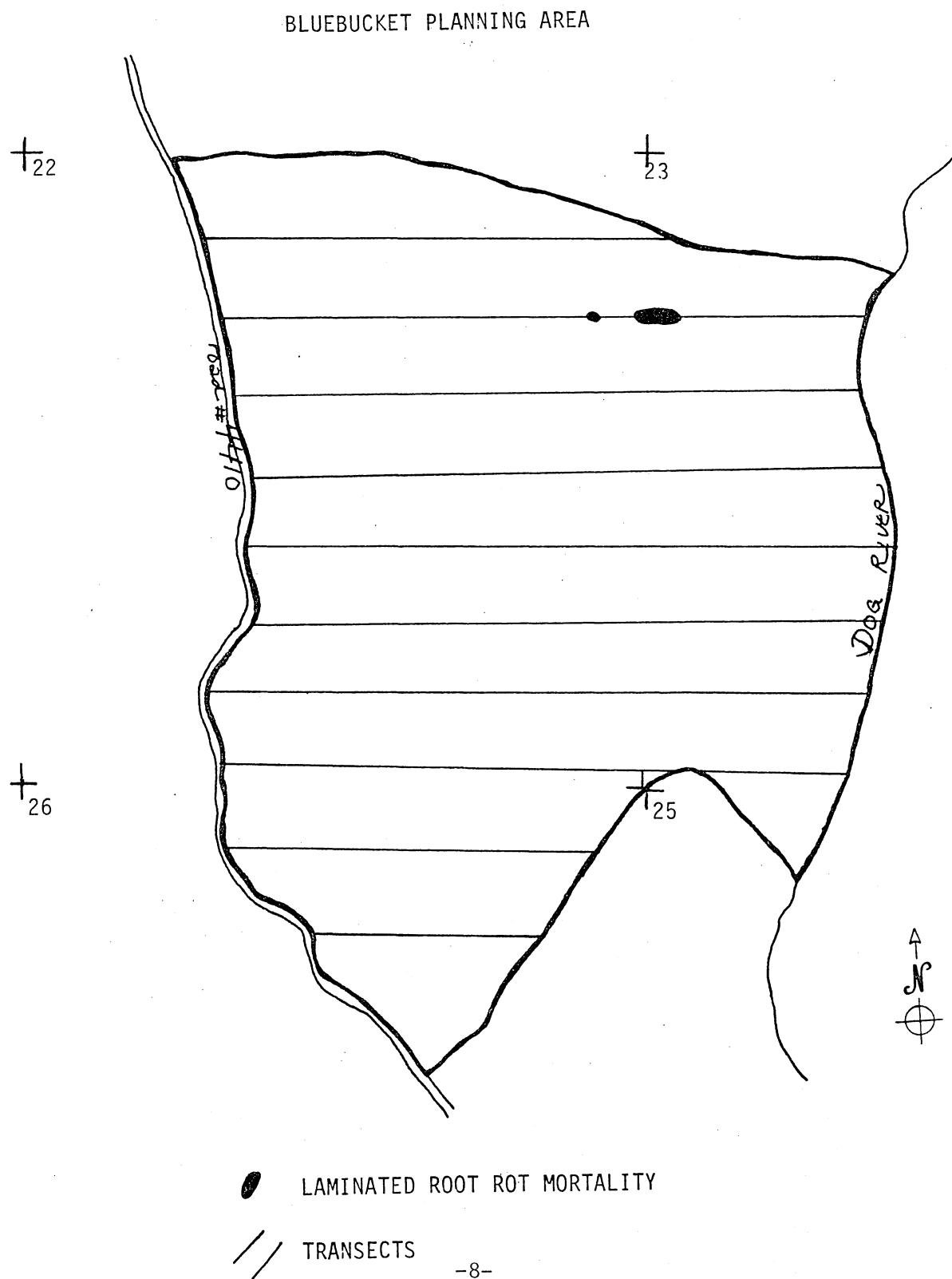


Figure 3.--Map of the Wampus Planning Area Showing Location of Major Areas Affected by Laminated Root Rot.

